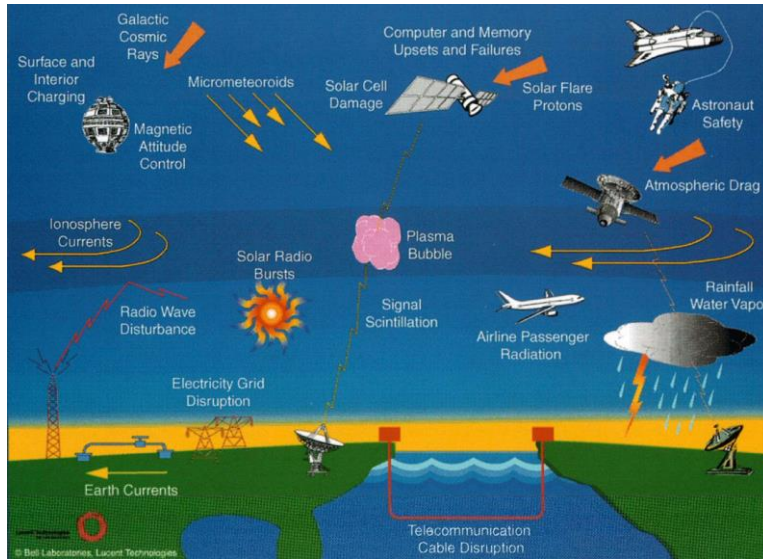




INNOVATIVE PROCUREMENT APPROACHES

WHAT REMAINS?





Risk assessment

- Functionality
- Support
- Production



Part selection

- Obsolescence control
- Know how
- Experience



Reliability assurance

- Characterization
- Screening
- Validation

Parts approach requiring technical analysis

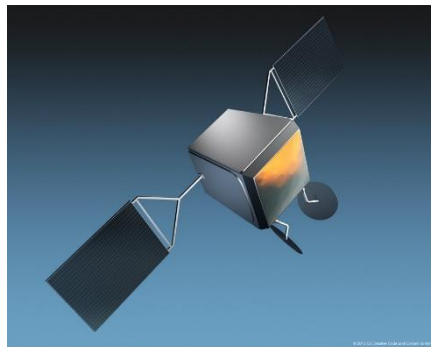
- Radiation levels, dominant effects,
- Working temperature conditions: ranges and cycles
- Demanded technologies to achieve mission challenges,
- Identification of equipment – component criticality within the satellite
- Mission acceptance risk at different levels
- Component volumes, constellation size, recurrence, ...
- Time frame
- Cost

WHY CHANGING?

The pressure of the market requires better performance at lower prices

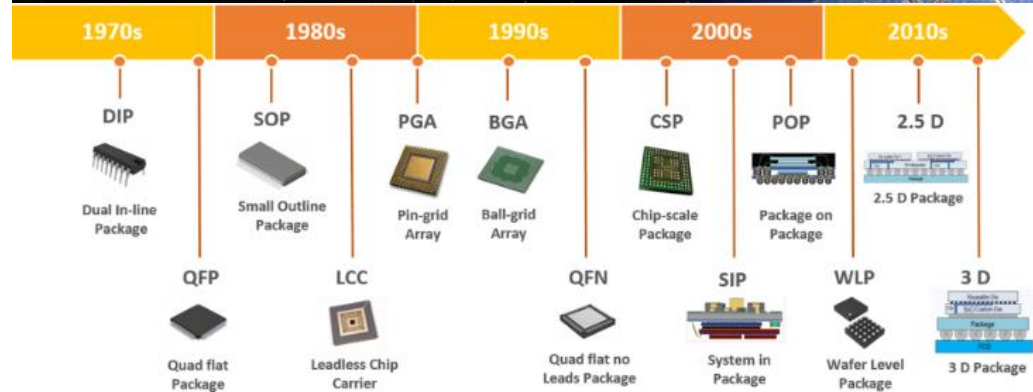
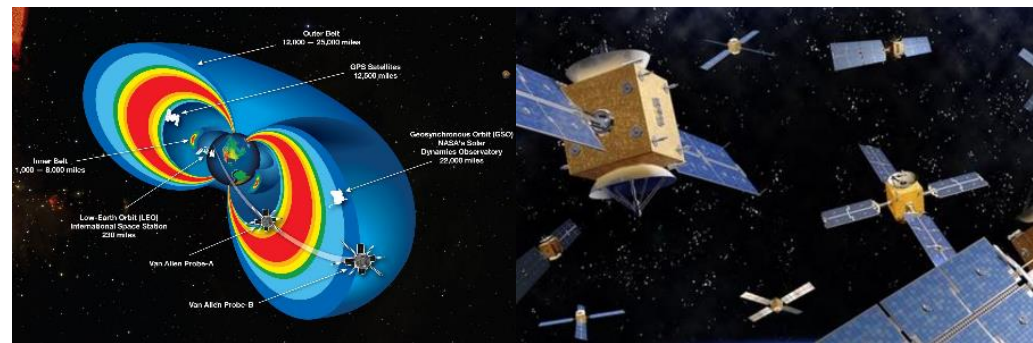
Parts selection based on:

- New technologies
- Mass production
- Low cost
- Higher performance
- Low (no) heritage



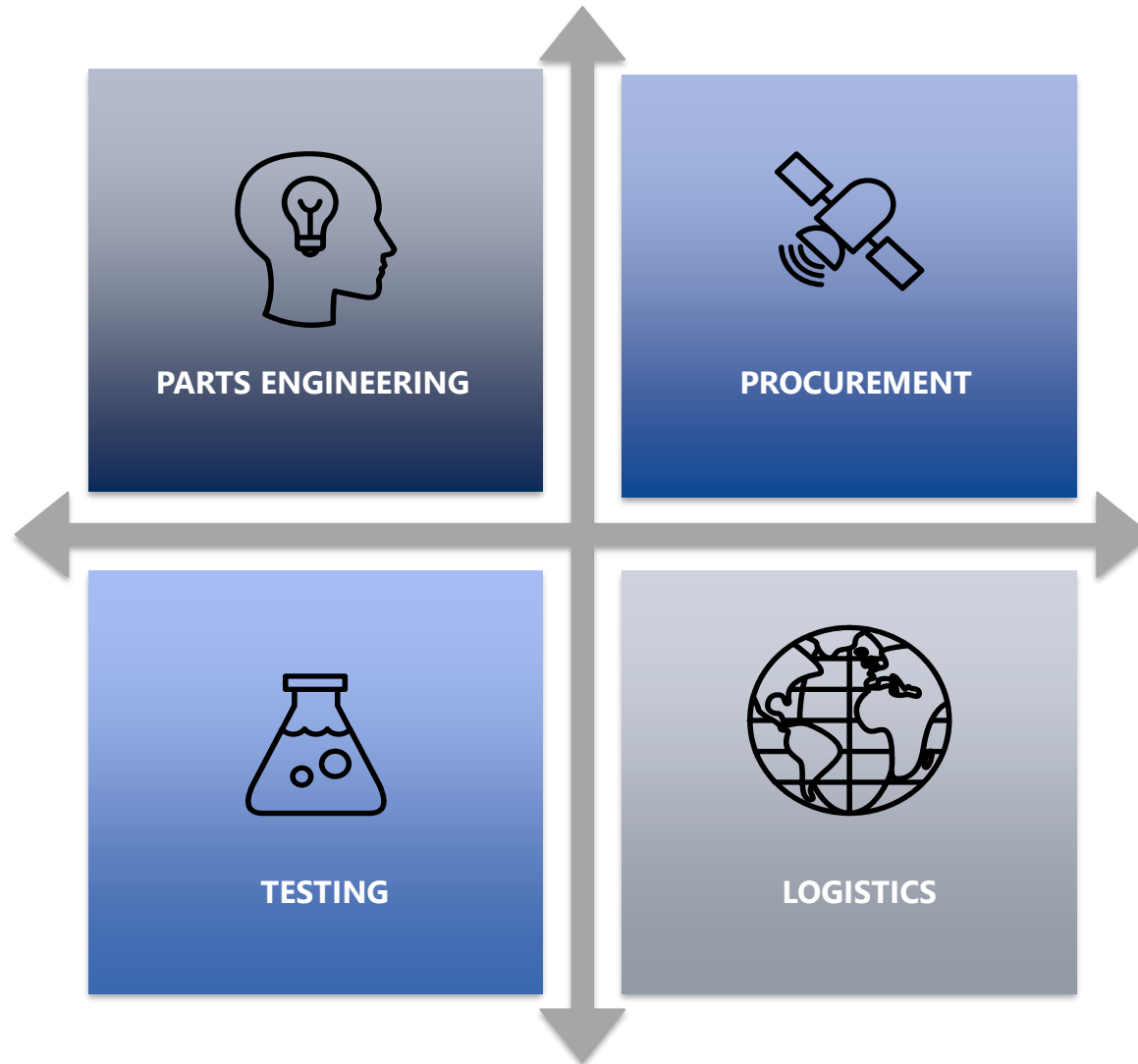
Facts & Figures

- size
- less than weight
- 150 kg
- up to 4 built every day
- 900 satellites to be built



The space industry is a slow adopter of new technologies

WHAT IS PROCUREMENT?



COLLABORATIVE APPROACH



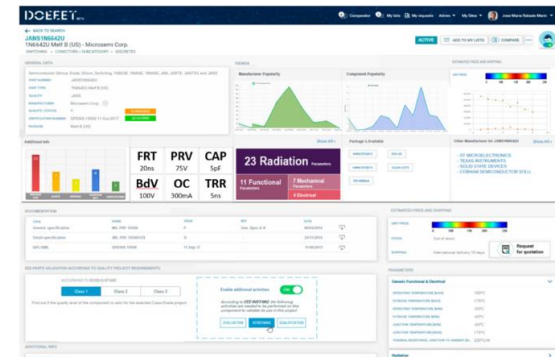
SELECTION AND VALIDATION

Selection no longer as an individual analysis

Multiple sources



All required information in a single platform



Unit price | Validation – Non recurrent cost | Granted reliability level | Manufacturer confidence status
 | Radiation level against mission requirement | Risk impact associated to device malfunction, at board, ...

SELECTION AND VALIDATION




Compare and find what better fits your needs

DOEEET 1.0 Comparator My DCLs/BOMs My requests Jose Carlos Muñoz Hueso

← BACK

COMPARATOR ①

FAMILY GROUPS CLEAR TABS .../NTC/Chip (3) X .../PTC/Leaded (2) X .../Bipolar/PNP (2) X .../Bipolar/NPN (2) X .../ROM/EEPROM (1) X .../Data Converter/Analog to Digital Converters (5) X .../RAM/SRAM (10) X

COMPONENT	Mark as reference	Mark as reference	Mark as reference	Mark as reference	Mark as reference	Mark as reference	Mark as reference
5962-0622903QYC AT68166FT-YS20MQ Microchip Technology Nantes (for...  	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5962-8959841MMA QP7C1009B-15LMB QP Semiconductor							
5962-8959841MMA QP7C1009B-15LMB Teledyne e2v, Inc. (formerly ...							
5962-8959817MZA MT5C1008C-55L Micros Components (form...)							
5962-8959834MZA EDI88130CS55TB Mercury Systems, Inc.							
5962-0622908QXC AT68166H-YM20MQ Microchip Technology Nant... 							
5962-0622908QXC AT68166H-YM20MQ Microchip Technology Nant...							
PROCUREMENT INFO	PROCUREMENT INFO	PROCUREMENT INFO	PROCUREMENT INFO	PROCUREMENT INFO	PROCUREMENT INFO	PROCUREMENT INFO	PROCUREMENT INFO
Price 2471.34 Euro < > 4589.62 Euro	Price 3140.15 Euro < > 5831.7 Euro	Price 3140.15 Euro < > 5831.7 Euro	Price 3140.15 Euro < > 5831.7 Euro	Price 3139.25 Euro < > 5830.04 Euro	Price 3139.25 Euro < > 5830.04 Euro	Price 3139.25 Euro < > 5830.04 Euro	Price 1861.03 Euro < > 3456.19 Euro
Common related charges 0 Euro	Common related charges 0 Euro	Common related charges 0 Euro	Common related charges 0 Euro	Common related charges 0 Euro	Common related charges 0 Euro	Common related charges 0 Euro	Common related charges 0 Euro
Manufacturer Lead Time 12 weeks <> 14 weeks	Manufacturer Lead Time 12 weeks <> 14 weeks	Manufacturer Lead Time 12 weeks <> 14 weeks	Manufacturer Lead Time 12 weeks <> 14 weeks	Manufacturer Lead Time 12 weeks <> 14 weeks	Manufacturer Lead Time 12 weeks <> 14 weeks	Manufacturer Lead Time 12 weeks <> 14 weeks	Manufacturer Lead Time 12 weeks <> 14 weeks
GENERAL DATA	GENERAL DATA	GENERAL DATA	GENERAL DATA	GENERAL DATA	GENERAL DATA	GENERAL DATA	GENERAL DATA
PARAMETERS	PARAMETERS	PARAMETERS	PARAMETERS	PARAMETERS	PARAMETERS	PARAMETERS	PARAMETERS
SPECIFIC FUNCTIONAL & ELECTRIC...	SPECIFIC FUNCTIONAL & ELE...	SPECIFIC FUNCTIONAL & ELE...	SPECIFIC FUNCTIONAL & ELE...	SPECIFIC FUNCTIONAL & ELE...	SPECIFIC FUNCTIONAL & ELE...	SPECIFIC FUNCTIONAL & ELE...	SPECIFIC FUNCTIONAL & ELE...
MECHANICAL DATA	MECHANICAL DATA	MECHANICAL DATA	MECHANICAL DATA	MECHANICAL DATA	MECHANICAL DATA	MECHANICAL DATA	MECHANICAL DATA
GENERIC FUNCTIONAL & ELECTRIC...	GENERIC FUNCTIONAL & ELE...	GENERIC FUNCTIONAL & ELE...	GENERIC FUNCTIONAL & ELE...	GENERIC FUNCTIONAL & ELE...	GENERIC FUNCTIONAL & ELE...	GENERIC FUNCTIONAL & ELE...	GENERIC FUNCTIONAL & ELE...
SUBCLASSIFICATION	SUBCLASSIFICATION	SUBCLASSIFICATION	SUBCLASSIFICATION	SUBCLASSIFICATION	SUBCLASSIFICATION	SUBCLASSIFICATION	SUBCLASSIFICATION
RADIATION: POTENTIAL SENSITIVI...	RADIATION: POTENTIAL SENS...	RADIATION: POTENTIAL SENS...	RADIATION: POTENTIAL SENS...	RADIATION: POTENTIAL SENS...	RADIATION: POTENTIAL SENS...	RADIATION: POTENTIAL SENS...	RADIATION: POTENTIAL SENS...
RADIATION FEATURES: TID & TNID	RADIATION FEATURES: TID & ...	RADIATION FEATURES: TID & ...	RADIATION FEATURES: TID & ...	RADIATION FEATURES: TID & ...	RADIATION FEATURES: TID & ...	RADIATION FEATURES: TID & ...	RADIATION FEATURES: TID & ...
RADIATION FEATURES: SEE	RADIATION FEATURES: SEE	RADIATION FEATURES: SEE	RADIATION FEATURES: SEE	RADIATION FEATURES: SEE	RADIATION FEATURES: SEE	RADIATION FEATURES: SEE	RADIATION FEATURES: SEE
ADDITIONAL INFO	ADDITIONAL INFO	ADDITIONAL INFO	ADDITIONAL INFO	ADDITIONAL INFO	ADDITIONAL INFO	ADDITIONAL INFO	ADDITIONAL INFO
View 28 alternative components							View 28 alternative components

SELECTION AND VALIDATION

Get full control of your needs

DOEEET 1.0
[Comparator](#) [My DCLs/BOMs](#) [My requests](#) Jose Carlos Muñoz Hueso

← BACK TO MY DCLs/BOMs / DCL/BOM DETAILS

DCL/BOM NAME	ISSUE	REVIEW	CREATION DATE	STATUS
MY SUCCESSFUL PROJECT	1	-	12/02/2019	IN PROGRESS

GET ROM PRICES
REQUEST PROPOSAL
⋮

DCL/BOM COMPONENTS (75)

SEARCH

ESA FAMILY (FC)

ESA GROUP (GC)

CLEAR FILTERS

ACTIONS

DOEEET	PART MATCHING	DOEEET AND USER PART DETAILS						USER PART DATA					
ITEM	PART REFERENCE	STATUS	FC	GC	GENERIC SPEC.	DETAIL SPECIFICATION	QUALIFICATION STATUS	QUALITY	QPL	REFERENCE	USER PT	QUANTITY	PROCUR
✓ #112	JANSIN6864US 1N6864US Maf E (US) MICROSEMI CORP	✓ Matched	04	02	MIL-PRF-19500	MIL-PRF-19500/620	Y	JANS	QPSIS-19500	1+A116	JANSIN6864US MICROSEMI CORP	192	
✓ #27	M55342K06B22D1R RM0705 22R1 1% 100ppm/°C Chip VISHAY DALE ISRAEL	✓ Matched	10	09	MIL-PRF-55342	MIL-PRF-55342/6	Y	FR R	QPSIS-55342	1+A31	M55342K06B22D1R VISHAY DALE ISRAEL	20	
✓ #28	M55342K06B22T0R RM0705 22M0 2% 100ppm/°C Chip VISHAY DALE ISRAEL	✓ Matched	10	09	MIL-PRF-55342	MIL-PRF-55342/6	Y	FR R	QPSIS-55342	1+A32	M55342K06B22T0R VISHAY DALE ISRAEL	72	
✓ #29	M55342K06B22E1R RM0705 22K1 1% 100ppm/°C Chip VISHAY DALE ISRAEL	✓ Matched	10	09	MIL-PRF-55342	MIL-PRF-55342/6	Y	FR R	QPSIS-55342	1+A33	M55342K06B22E1R VISHAY DALE ISRAEL	8	
✓ #30	M55342K06B20E0R RM0705 20K0 1% 100ppm/°C Chip VISHAY DALE ISRAEL	✓ Matched	10	09	MIL-PRF-55342	MIL-PRF-55342/6	Y	FR R	QPSIS-55342	1+A34	M55342K06B20E0R VISHAY DALE ISRAEL	24	
✓ #31	M55342K06B2000R RM0705 200R 1% 100ppm/°C Chip VISHAY DALE ISRAEL	✓ Matched	10	09	MIL-PRF-55342	MIL-PRF-55342/6	Y	FR R	QPSIS-55342	1+A35	M55342K06B2000R VISHAY DALE ISRAEL	20	
✓ #32	M55342K06B1D00R RM0705 1K00 1% 100ppm/°C Chip MINI SYSTEMS	✓ Matched	10	09	MIL-PRF-55342	MIL-PRF-55342/6	Y	FR R	QPSIS-55342	1+A36	M55342K06B1D00R SOA U	8	
✓ #118	3201009038L0M SESI 15WR 8.0uH 20% Moulded Chip EXXELIA SAS (SITE DE D'ILLANGE)	✓ Matched	07	03	ESCC 3201	ESCC 3201/009	Y	ESCC	ESCC QPL	1+A122	3201009038L0M 3201009038L0M MSP F	12	
✓ #33	M55342K06B1F00R RM0705 1M00 1% 100ppm/°C Chip VISHAY DALE ISRAEL	✓ Matched	10	09	MIL-PRF-55342	MIL-PRF-55342/6	Y	FR R	QPSIS-55342	1+A37	M55342K06B1F00R VISHAY DALE ISRAEL	267	
✓ #119	320100905100M SESI 9.1WR 10uH 20% Moulded Chip EXXELIA SAS (SITE DE D'ILLANGE)	✓ Matched	07	03	ESCC 3201	ESCC 3201/009	Y	ESCC	ESCC QPL	1+A123	320100905100M 320100905100M MSP F	16	
✓ #34	M55342K06B1E50R RM0705 1K50 1% 100ppm/°C Chip VISHAY DALE ISRAEL	✓ Matched	10	09	MIL-PRF-55342	MIL-PRF-55342/6	Y	FR R	QPSIS-55342	1+A38	M55342K06B1E50R VISHAY DALE ISRAEL	12	

SELECTION AND VALIDATION

All data in a single page

PARAMETERS

Specific Functional & Electrical		▼
C_{OBD} [MAX] (OUTPUT CAPACITANCE, (COMMON BASE) INPU...	12pF	
C_{IBD} [MAX] (INPUT CAPACITANCE, (COMMON BASE) COLLEC...	48pF	
CAPACITY:	16M	
ORGANIZATION:	512K x 32	
T_A [MAX] (ACCESS TIME [MAX]):	20 ns	
Radiation: Potential Sensitivity		>
Mechanical Data		>
Generic Functional & Electrical		>
Radiation Features: TID & TNID		>
Subclassification		>

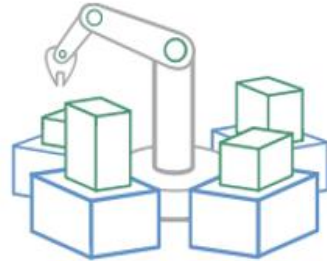
INNOVATION IN TESTING

Testing and validation based on a collaborative approach between suppliers and customers



1 DESIGN

Design your tests over the web



2 CONDUCT

Virtual Lab conducts your tests



3 EXPLORE

Virtual Lab organizes your data into a smart data base

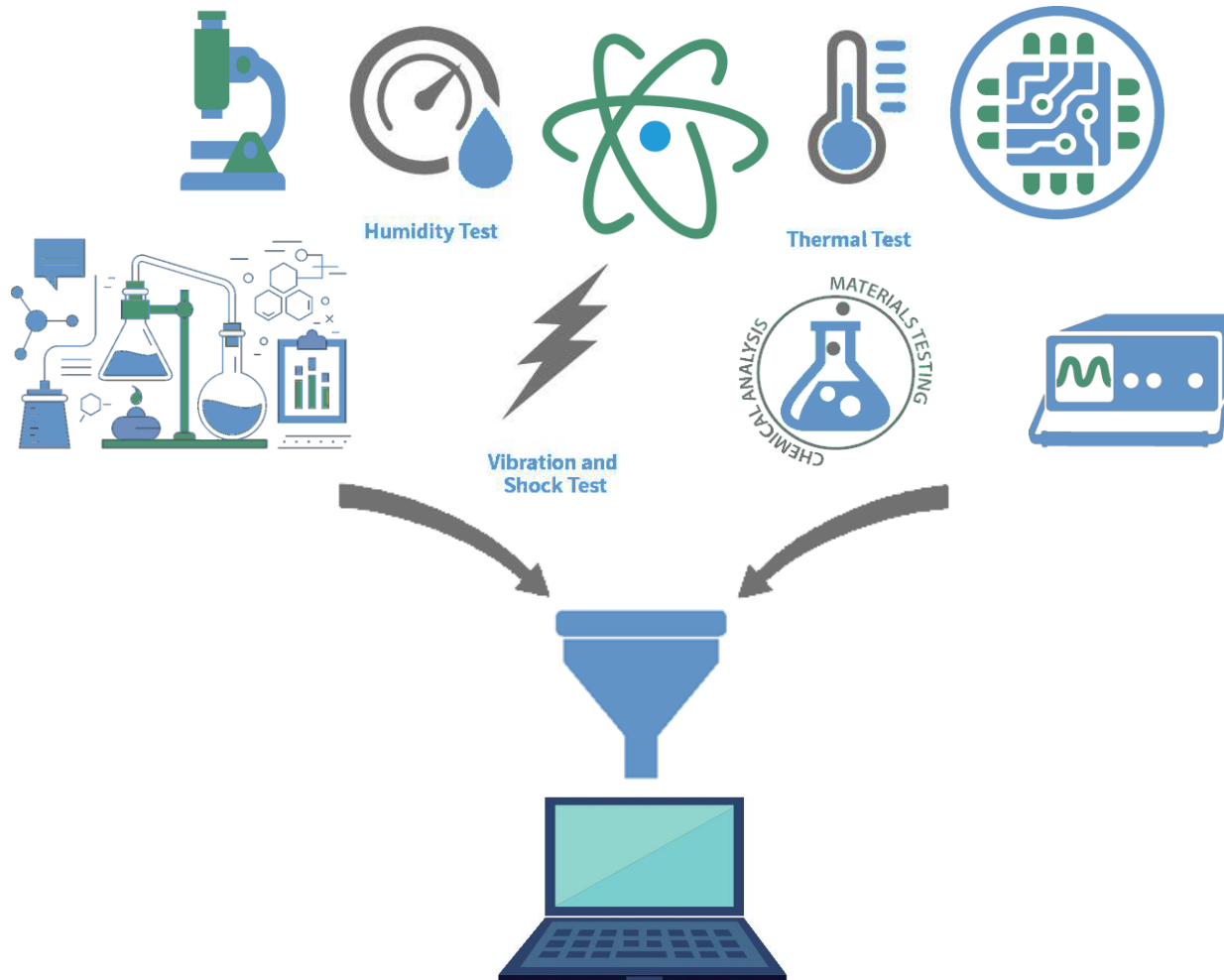


4 ANALYZE

DOEET crunches and analyzes data

VIRTUAL LAB

Test design using all available knowledge from EEE parts to specific application needs

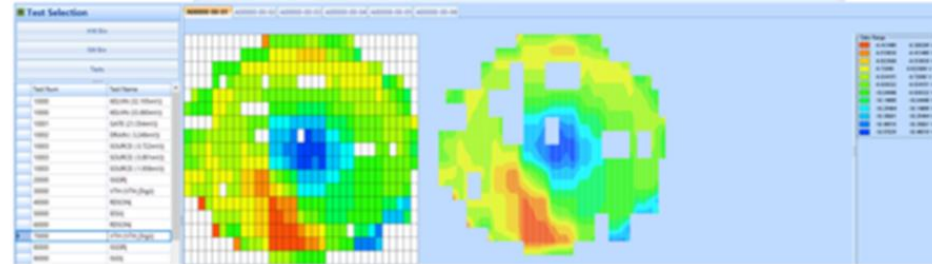


WHAT IF NOT AVAILABLE?

Use of RT dice or commercial wafers (full traceability)

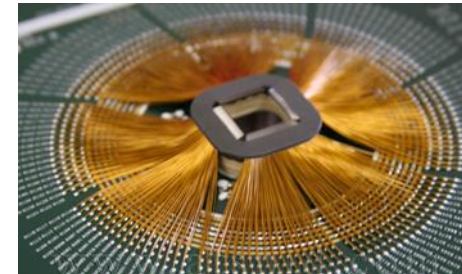
Why use plastic package over ceramic or metal?

- Smaller package footprint.
- Chip performance.
- Cost reduction.



Why QFN / BGA

- Very flexible, range of package sizes with same tool.
- Low cost to switch between packages / customise.
- Matches market requirements.
- Why not leaded packages? - dedicated tools per type.



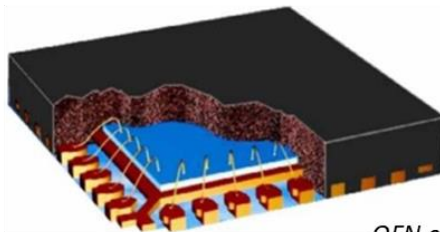
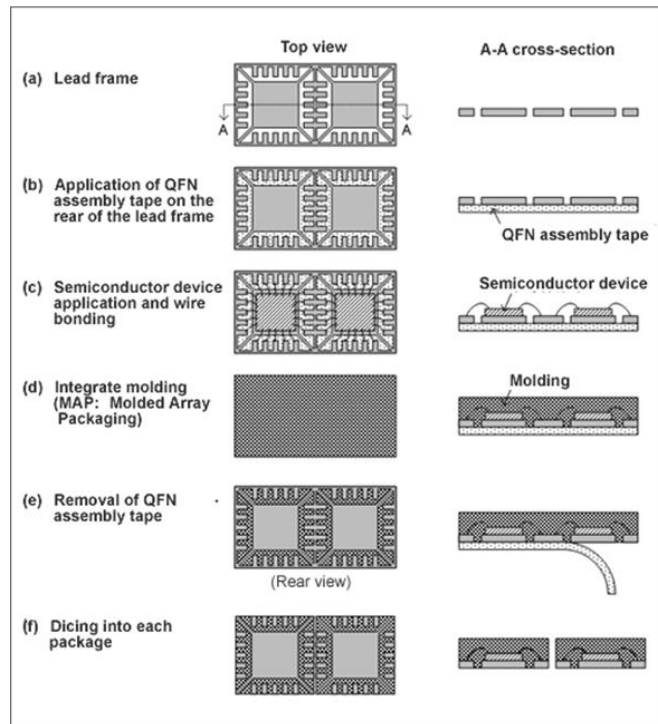
Current Market Offering and Trends

- Plastic packaging centred in Asia.
- Difficult to access for low volumes.
- Plastic widely adopted in most markets.
- Emerging use in Space.
- APC and Sencio offer molding in NL, focussed on advanced packaging



PLASTIC PACKAGING

Process Illustration



QFN cut-away

Can be beneficial for:

- Fast Prototyping
- Low volume production 1000 – 10,000 per lot.
- Space, custom assemblies not catered by OCM.
- Specialist applications – i.e. Ribbon, wedge, flip-chip.

With tailored testing approach based on mission and requirements.

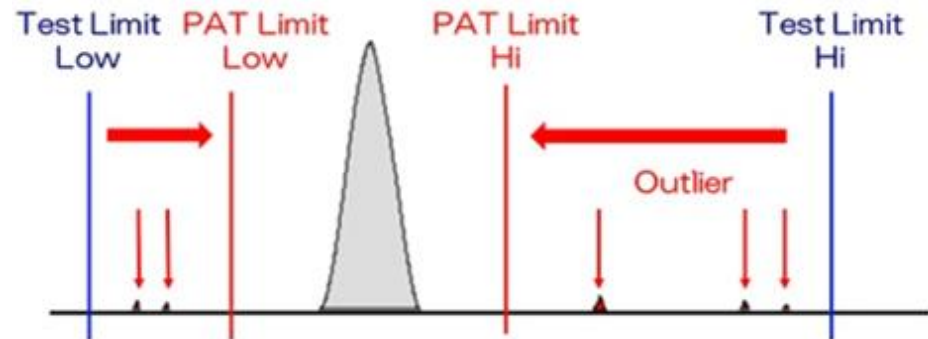
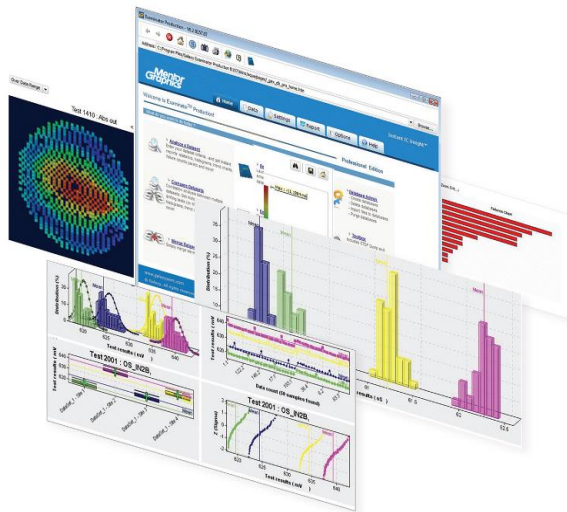
Assumptions

- Package body size variations achieved with a new lead frame / substrate.
- Common 0.9mm thickness could be established as a first offering.
- NiPdAu/Ag pre-plated lead-frame
- Laser mark
- Design the mold to allow just a change of top plate to increase the depth.

TESTING

To perform complete lot procurement (even at wafer level), same date code and same wafer diffusion to avoid any variability and test complete lot to minimize test cost.

- Perform upscreening for extended temperature ranges -55°C up to +125°C or mission specifics.
- Perform post processing analysis using PAT (Process average testing) technics to eliminate outliers parts.
- Perform limited radiation test on key devices according to the mission profile and satellite lifetime.
- Perform functional safety analysis at system level (ISO 26262) FMEA/FMEACA (Failure Modes, Effects and Criticality Analysis) to determine critical devices.



CONTACT



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THANK YOU!